North Carolina Highway Bulletin

VOL. III AUGUST, 1922 NO. 6

TUCKASEIGEE FALLS, JACKSON COUNTY, FROM PROJECT 952-A

The Town that Prospers has Good Roads

GOOD streets and roads are essential to the welfare of a community.

Concrete, the material that grows sturdier with age, makes the best roads.

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Many of the best examples of concrete roads, streets, pavements, and alleys have been built with Lehigh—the national cement.

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LEHIGH PORTLAND CEMENT COMPANY
ALLENTOWN, PA. RICHMOND, VA.
Offices and Mills from Coast to Coast

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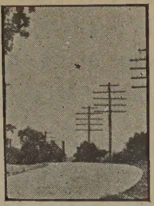
NORTH CAROLINA HIGHWAY BULLETIN

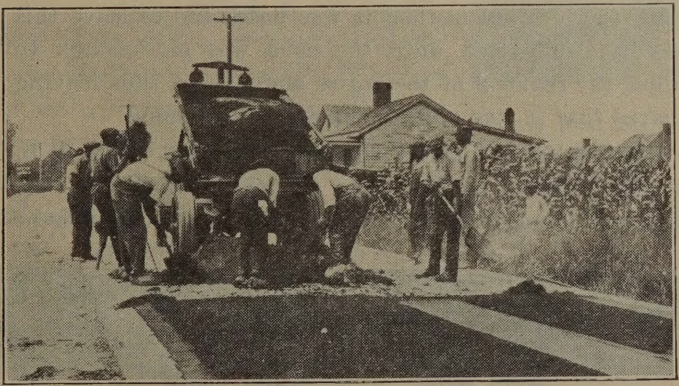


Vol. III, No. 6 H. K. WITHERSPOON, Editor AUGUST, 1922

Rocky Mount-Tarboro Highway Being Hardsurfaced

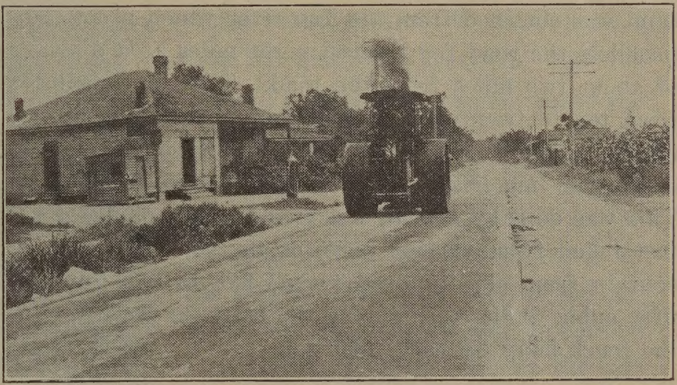
NOT only will local traffic be benefitted by the construction of State Project No. 125, locally known as the Rocky Mount-Tarboro Road, but the people of the north-eastern section of the State will be afforded a direct route to the State capital and to points further west, and with other projects on the same route, No. 90, it will form a stretch of hard surfaced "all the year 'round" road from Raleigh to Williamston, Greenville and Washington. A hard surfaced road has already been completed from Nashville, the county seat of Nash County, to Rocky Mount and the completion of Project no. 125 will connect the two county seats with a paved road of the highest type.

Project No. 125 is 15.11 miles in length, connecting the paved streets of the two towns. The contract was let on February 20th, 1922, to R. G. Lassiter & Co., of Oxford, the bid price being $386,671.60, this figure including the construction of three bridges and three box culverts which are a part of the project. The paved portion of the roadway will be sixteen feet in width, including twelve inch shoulders on either side. The base will be of cement concrete construction five inches thick while the wearing surface will be of asphaltic concrete fourteen feet wide, and two inches thick. On either side of the paved road there will be seven foot soil shoulders making the entire roadway thirty feet in width.



Spreading and Raking Hot Asphalt Mix

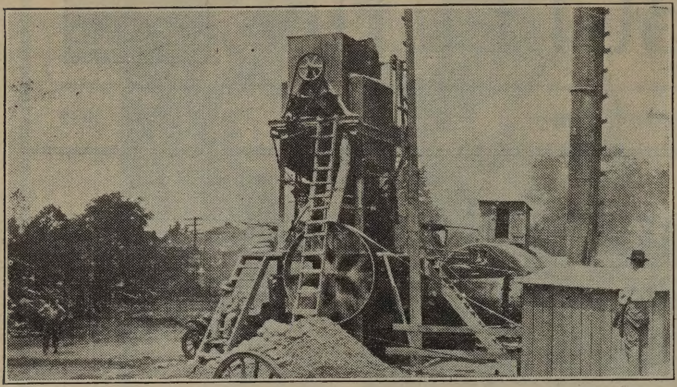
Construction was begun on the project on February 28th when a force began clearing and grubbing, this force being followed by a grading force with 20 mules.



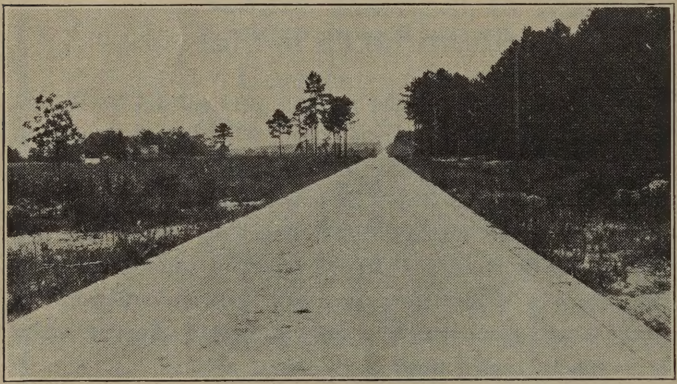
Rolling Wearing Course

The heavy grading on the project was sub-let to W. W. Tuck & Sons, of Virgilina, Va., who began work on March 18th with a force of 18 mules. The heavy fills have all been completed and will have some time to settle before the concrete base is put on them. All fills over one foot in depth were rolled in one foot layers with a three wheel ten-ton roller, and in addition all heavy hauling and traffic was turned over them in order to hasten the settlement.

The first concrete base was poured on April 21st, work being started three miles out from Rocky Mount and carried toward the town, after which the mixer was carried to Tarboro and work begun one mile from town as the first mile on that end was located through a stretch of swampy woods and it was desired to let the fill settle as much as possible. On the Rocky Mount end of the job stone from the Neverson Quarries was used with local sand, both materials being stockpiled alongside of the road at points one thousand feet apart. Ford trucks equipped with Easton dump bodies were used in measuring the aggregates, a false bottom being placed in them so that when loaded even full the truck would hold 22½ cubic feet. The sand was loaded into the trucks by hand while a "Barber-Greene" loader was used to load the stone. Cement was piled on the side of the roadway just outside of the forms and placed in the skip of the mixer after the sand and stone had been dumped. Mixing was done by a 3-bag "Foote" mixer mounted on wheels. On the Tarboro end of the project sand was obtained from the Tar river which practically parallels the road for the last eight miles at a distance of about two miles from the road. This sand contains from ten to twenty-five per cent of pebbles and it was therefore necessary to make tests to ascertain the amount of pit-run material necessary for a three bag batch. This was done by making a screen analysis of five cubic feet taken from various parts of the stock piles which contain from one hundred twenty-five to two hundred fifty cubic yards, and moving the mark on the inside of the truck body for each stock pile.



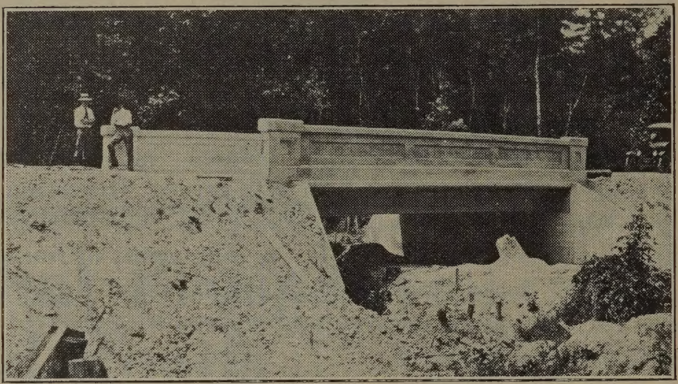
PLANT WHERE SURFACING MATERIAL IS MIXED



A SECTION OF FINISHED ROAD

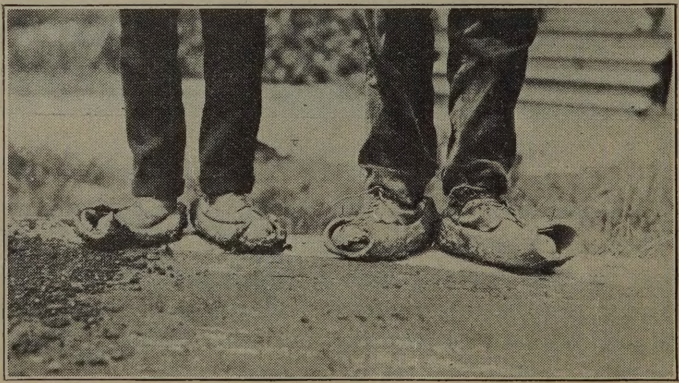
All fine grading is done by hand and the cross-section of the subgrade checked by the use of two templates cut to the required section, one just ahead of the mixer and one between the mixer and the concrete as it is poured, the latter to take care of the ruts made by the wheels of the mixer and material trucks. The subgrade is thoroughly rolled by a ten-ton roller which works just ahead of the mixer. The concrete is struck off and tamped with the standard tamp-template used on all base work in the State. When the job was first started the implement was used wholly as a tamp but after having considerable trouble in keeping the forms to line and grade the tamping was lightened and the striking-off increased. In this way a combination of the two methods was obtained and very good results secured.

Heltzel forms weighing ten pounds to the foot and having a depth of seven inches are used and have been giving satisfaction. It was found necessary to use one chair at each end and one in the middle of each ten foot section of form. Atached to the forms when they were received on the job was a curb form made of a 2-inch angle supported from the base form in such a way as to allow the pouring of a 6-inch curb or header. After pouring about fifteen hundred feet of the base with this arrangement it was changed by cutting off the braces that held the angle in place and by substituting wooden cleats. By this arrangement it was possible to place the 2-inch side of the angle on the concrete thus giving a larger bearing surface, and to remove the wooden cleats before it was possible to remove the angles thus allowing the finishing of the curb under the cleats where with the original method it was necessary to leave this portion unfinished until the curb was old enough to allow the removal of the entire angle form, thus leaving marks that it was almost impossible to remove.



ONE OF THE HANDSOME BRIDGES ON THE PROJECT

The asphaltic concrete surfacing material is mixed in a semi-portable mixing plant having a capacity of one thousand pounds to the batch. The plant is at present



SECTIONS OF AUTO TIRES USED TO PROTECT FEET OF LABORERS FROM HOT ASPHALT

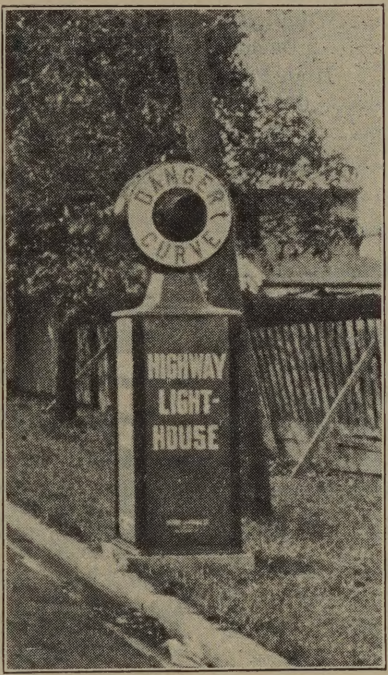
(Continued on page 9)

Flashing Signals *to be* Placed *on* State Highway System

WITH the constant addition of improved roads to the highway systems all over the United States and with the corresponding increase in the number of motor vehicles which are driven at a higher rate of speed because of the good roads the necessity for protecting the travelling public has become imperative. Statistics show that in 1921 more than 12,000 people were killed, over 300,000 injured more or less seriously, and at least $1,000,000,000 property loss resulted from motor accidents alone. These accidents were not confined to grade crossings alone but the majority occurred on the highways on curves, at cross-roads, on steep grades, etc.

There are two main causes for accidents that occur on the highways; the first, ignorance of the danger ahead,—and every motorist is subject to this cause; the second, actual disregard of the danger that is known to be impending. The saying that ''familiarity breeds contempt'' is thoroughly applicable to the average driver who, after becoming familiar with his car, is prone to treat sharp curves, steep grades, and railroad crossings with contempt, a result of which is that he is sooner or later treated by the undertaker. One writer, prominent in motoring circles recently said, ''There is one thing sure, and that is that the motorist who fails to obey the 'Stop' and 'Look' portions of the sign will will eventually be in no position to 'Listen.' ''

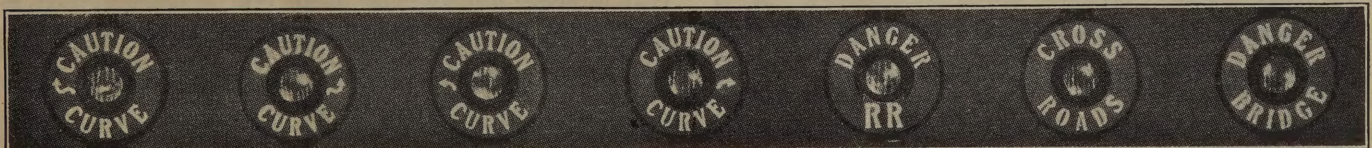
The State Highway Commission of North Carolina has paid special attention to the elimination as far as possible of many of the dangers incident to highway traveling by placing at all crossings on all steep grades, on all curves, and at all bridges, painted signs calling attention to the danger and from reports which have reached the office these signs have been a great help in preventing accidents which would otherwise have occurred. With a view to still further safeguarding the highways, officials of the Commission recently signed an agreement with the American Gas Accumulator Co., of Elizabeth, New Jersey, whereby this firm will place at numerous dangerpoints on the State highway system flashing danger signals similar to that shown in the illustration accompanying this article. These signals have been installed on the highways of several other states and have given very satisfactory service.



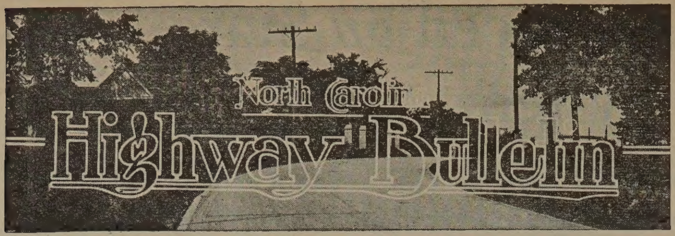
THESE WILL SOON BE SEEN ON THE STATE HIGHWAYS

The operation of the flashing signal is entirely automatic except for replacing the gas tank approximately once every five or six months. In the base of the stand supporting the light is a tank of dissolved acetylene and the necessary valves, etc., which cause the light to flash once every second. It is a well known fact that the eye is quickly attracted by any object in motion and in this fact lies the value of the signal. On either side of the signal as one approaches will be carried a neat advertisement while on the side of the stand next to the road will be carried information as to the mileage to the next town and information of value to the traveller. At the bottom of this page are shown several designs of the signal proper which are used at the various places as indicated by the legend. The cost of installing and maintaining the ''Highway Light Houses'' will be taken care of by the advertisements which each one will bear on either side.

The first two signs to be installed in the State will be placed on the Raleigh-Cary road at the grade crossing just west of Raleigh and these two should be in place within a short time after which others will be installed as rapidly as conditions will permit.



WARNINGS CARRIED BY "HIGHWAY LIGHTHOUSES"



PUBLISHED MONTHLY BY
NORTH CAROLINA STATE HIGHWAY COMMISSION
RALEIGH, NORTH CAROLINA

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Address all communications in regard to BULLETIN to the Editor, Box 1140, Raleigh, N. C.

This BULLETIN will be sent gratis to any State or county official, contractor, newspaper, trade publication, library, or other person interested in the improvement of roads and in the work of the Commission. Advertising rates may be obtained on application.

Volume III **AUGUST, 1922** **Number 6**

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Editorial

Why portland cement is called by that name is probably unknown to a number of people engaged in the roadbuilding game. Elsewhere in this issue of the Bulletin is published an article giving the origin of this name.

Virginia is attempting to meet the ever-present grade crossing menace by the passage of a law requiring motorists to come to a full stop before crossing railroad tracks. This is doubtless a step in the right direction but the fact that it will be impossible to place a watchman at every crossing to enforce this law brings the whole question back to the common sense of the person doing the driving. A sensible person will stop of his own accord.

The Bulletin appears this month in a new dress which it is believed will add to the attractiveness of the publication. The photograph on the cover shows the Tuckaseigee Falls in Jackson County as seen from the location of State Project No. 952-A, for which the contract was let a short time ago. This is one of many beautiful scenes that will be opened to the public by the construction of the system of roads throughout the western section of the State.

Strike conditions throughout the State have very materially interfered with the road building program which is being carried on by the Commission and this is particularly true in the case of hard surface construction where practically all of the material has to be shipped in by rail. Fifteen or twenty jobs have been shut down entirely while almost all of the others that are under construction are being carried on at much less than normal speed. From figures obtained from contractors throughout the State it is estimated that the strike is costing the contractors, and indirectly the people of North Carolina, approximately $61,000 per week and has necessitated the lay-off of something like 5,000 men. Unless the situation improves within a very short time these figures will be very materially increased due to the fact that an additional number of jobs will have to shut down. With approximately 550 miles of hard surface work under construction at the present time one can readily see the immense amount of time that is being lost and the delay that is being caused in the completion of the State system of roads. With only the summer months available for work all projects in the western part of the State will be practically at a standstill until the opening of the construction season next Spring.

Contracts Awarded July 25th

TWENTY projects, totalling 160.9 miles of roads and bridges were let to contract on July 25th when bids were opened for this work. The results, classified by districts, are as follows:

First District

Project 131, Gates County, consisting of 13.50 miles of road between Winton and Gatesville was let to Bacon & Moore, of Littleton, for the grading and surfacing with topsoil, and the structures to the W. D. Murray-Sadler Co., of Norfolk, the total cost of construction being approximately $135,516.00.

J. A. Morrow, of Clarksville, Va., was low bidder on project 132, Gates County, 9.73 miles of road between Gatesville and Sunbury. No surfacing will be placed on the road at present, the cost of the work, $63,921.00, covering only the grading and structures.

Project 173, Perquimans-Pasquotank counties, was awarded to Williams & Williams, of South Mills on a bid of $239,444.70. The contract calls for the grading and surfacing with reinforced concrete the 7.22 miles included in the project, which extends from Woodville to Elizabeth City.

Project 183-A, Pitt County, 13.54 miles of road between Greenville and Bethel, was awarded to S. J. Groves and Sons, of Minneapolis, Minn., for grading and plain concrete surfacing at a cost of $399,854.40. The structures on this project were let to B. J. Boyles, of Wilson and are now under construction.

Second District

Another step towards hard surfacing the Central Highway was taken when the contract for project 236. Johnston County, was awarded to R. G. Lassiter & Co., of Oxford, for asphaltic concrete surfacing on a cement concrete base. This piece of work extends from Smithfield to the Wake County line and links up Smithfield and Raleigh by a paved road. The cost of construction will be in round figures $475,000.00.

Third District

Project 342, Cumberland County, was awarded to A. J. Wardrep, of Knoxville, for asphaltic concrete surfacing. The work, located between Fayetteville and Hope Mills, a distance of 5.91 miles, will cost 177,402.00.

Fourth District

P. R. Ashby, of Raleigh, was successful bidder for the grading and plain concrete surfacing on 8.79 miles of highway between Raleigh and Neuse, known as project 484, while Booz-Lloyd & Co., of Marion, N. C., were awarded the structures on the same project. The total cost of construction will be in round figures $312,000.

Project 494, Warren County, was awarded to the Clifford Engineering Co., of Montgomery, W. Va., for $208.130.00. The work consists of grading and surfacing with asphaltic concrete the 6.21 miles of road between Norlina and the Vance County line.

Fifth District

The grading and surfacing with reinforced concrete of 7.78 miles of the National Highway, between Greensboro and Reidsville was awarded to the Leaksville Lumber Co., and the structures on the same project, No. 535, were let to the Hagedorn Construction Co., of Thomasville. The cost of construction will amount to approximately $259.357.00.

Project 569, Moore County, 18.97 miles between Aberdeen and the Lee County line, was awarded to Mayfield Construction Co., Denmark, S. C. This project, which forms an important link in the National Highway between Northern and Southern points will be graded and surfaced with sand clay at a cost of $97,151.00.

Sixth District

W. E. Graham of Mt. Ulla, was awarded the contract for surfacing with penetration macadam the road between Statesville and Taylorsville. The two projects, No. 602, Alexander County and No. 640, Iredell County, having an aggregate mileage of 17.45 will cost $379,320.

Project 694, a bridge over Richardson Creek, Union County, was awarded to Hagedorn Construction Co., of Thomasville, for $23,550.00.

Seventh District

The O'Brien Construction Company, of Birmingham, Ala., was awarded the grading and surfacing of project 702-A, Alleghany County, 7.75 miles between Sparta and Stratford, while the Luten Bridge Co., of Charlotte, was awarded the structures. Gravel and waterbound macadam will be used in surfacing the project, which in its entirety will cost $185,484.00.

The structures on Project 713, Ashe County, were awarded to the Concrete Steel Bridge Co., of Clarksburg. W. Va., for $20,815.00. On account of the high prices bid the roadway was not let.

Project 764, 1.63 miles of paving through the town of Pilot Mountain, Surry County, was awarded to the Leaksville Lumber Co., for $50,558.00. Reinforced concrete will be laid.

Eighth District

M. A. Kollock, of Marion, was awarded the contract for surfacing with topsoil 8.69 miles of road from Morganton to the Caldwell County line, towards Lenoir. The present roadbed will be utilized since it has recently been reconstructed by the Burke County Road Commission. The project, 814, will cost $13,460.00.

Ninth District

Project 952-A, Jackson County, was awarded to the Brooks-Callaway Co., of Atlanta, Ga., for $158,845.00. The project is 10.22 miles in length and extends from the Forks of Tuckaseige River to Transylvania County line.

Project 963, Macon County, 8.68 miles of road from Franklin to the Jackson County line, was let to Costello Bros., of Knoxville, Tenn., for the grading and the structures to the Brooks-Callaway Co., of Atlanta, the total cost being $121,355.00.

The History *of* "Portland" Cement

ONE of the questions most frequently asked concerning portland cement is the origin of its name. This is of very early origin and it is possible that a brief account of some of the early history of portland cement manufacture may be of interest.

The industrial world is indebted to John Smeaton, a Civil Engineer of England for unearthing facts which led to the perfection of the material now known as portland cement. Mr. Smeaton had been commissioned to build a lighthouse of masonry upon the Eddystone rocks off the harbor of Plymouth, England. These rocks were frequently covered at high tide and during stormy weather, and were a very serious menace to navigators entering the English Channel or Plymouth Harbor. Prior to Mr. Smeaton's work, the rocks had been marked by successive wooden towers carrying lights, but one after another these towers were destroyed by fire. The exposed location of the rocks and the violent storms which swept over them had led engineers to believe that nothing but a wooden structure bolted together could withstand the terrific pounding of the storms. Mr. Smeaton had been commissioned to build a lighthouse which would resist storms as well as fire and in 1756 determined to erect a masonry structure.

One of the many problems which he encountered in the erection of the structure was the need for a cement from which a mortar could be prepared which would develop high strength and which would harden under water. Being familiar with the fact that the early Romans had produced some kind of a hydraulic cement, Mr. Smeaton experimented throughout one entire winter with the available limestones until he finally succeeded in burning and grinding a cement which had the property of hardening quickly and under water.

Smeaton's lighthouse was completed successfully in the year 1759, and his success in producing a sound hydraulic cement was the subject of repeated comments during the many years in which the mortar joints withstood the terrfic storms without repointing. The lighthouse as a whole, remained in service for 123 years, or until the year 1882 when, though still in good condition, it was torn down and reconstructed, because it was desirable to erect a much higher tower with a more powerful light.

Mr. Smeaton's work in developing a hydraulic cement was of the utmost value to the English Admiralty in the construction of docks and wharves in various parts of the Empire. Several men produced hydraulic cements of varying qualities in England, but it was not until the year 1824 that the term "portland cement" was applied to any of these. In that year a patent was granted to one Joseph Aspdin, a bricklayer of Leeds, England, on a process of burning and grinding "Portland Cement." It appears the application of this term to the material had arisen from the fact that when the cement hardened into rock, its color and appearance were similar to a wellknown building stone which was quarried on the Isle of Portland on the south of England and extensively used in all structures of importance.

At this time the use of cement was confined to the preparation of mortars, and therein lies the forerunner of the test for tensile strength which is continued in standard specifications to this day. In the early days of cement manufacture, the strength of the cement was gauged by preparing a mortar and cementing two ordinary building brick together with it. When this mortar had hardened from three to eight days, the brick were fastened in iron clamps and suspended beneath a tripod. One of the clamps hung from the top of the tripod while weights were hung to the other clamp. The number of weights which had to be hung on the lower clamp in order to pull the two brick apart at the mortar joint, was a measure of strength of the cement mortar. This scheme, crude as it was, has given us the standard briquette of today and our tensile strength testing machine.

Another test for the strength of mortars much used in the early days was that of cementing one brick to another horizontally out from the face of a vertical wall. The number of brick which could thus be held together with mortar joints straight out from the face of the wall, was a measure of the strength of the cement.

Following the development of the discovery patented by Mr. Aspdin, cement was manufactured and successfully marketed in increasing amounts in England for many years. In the United States the construction of the Erie Canal proved to be the stimulus for the production of natural cement from deposits of suitable rock in Chittenango, Madison County, N. Y., about 1826. The first experiments in the manufacture of portland cement in the United States occurred near Allentown, Pa., in the heart of the Lehigh Valley, about 1868, although it was not until 1872 that a commercial portland cement was placed on the market. This was known as Saylor's Portland Cement, and it was used in the Eads jetties along the Mississippi River and in the Drexel Building in Philadelphia, which was one of the first, if not the first, of American skyscrapers. During the succeeding years other manufacturers successfully produced portland cement in various parts of the country and the production has increased rapidly up to the present time.

In 1884 production in the United States reached 100,000 barrels. In 1896 it exceeded 1,500,000 barrels, and in 1908 exceeded 50,000,000 barrels. At the present time production varies from 90,000,000 to 100,000,000 barrels per year, which is more than sufficient to supply the present requirements of the United States and per-

(Continued on page 16)

Virginia Passes Law *to* Reduce Grade Crossing Accidents

AT the last session of the General Assembly of Virginia a law was passed which makes it a misdemeanor not to stop before passing over grade crossings, a thing which any person with common sense should do without being forced to it by law. For the benefit of persons motoring in Virginia the law is published herewith:

1. Be it enacted by the General Assembly of Virginia, that except in cities and incorporated towns and villages of one thousand inhabitants or more, it shall be the duty of every person driving any vehicle on a public highway, in approaching a place where a railway crosses such public highway at grade, to stop before passing over such crossing, at a distance of not less than ten feet nor more than 100 feet from the nearest rail of such railway track. Provided, that this act shall not apply to any public railway crossing at a grade on railway lines on which only purely local trains are operated.

2. The provisions of this act shall not change or alter in any manner the existing law as to the duty or liability of railway companies for damages to persons or property. And failure to comply with the provisions of this act on the part of the driver of the vehicle shall not be considered contributory negligence in an action against the railway company for damage to persons or property, whether the same be for injury to the person or property of the driver or any other person. And it shall not be necessary to establish the fact that the driver complied with the provisions of this act in order to recover in any action for damage to person or property against a railway company.

3. That except in cities and incorporated towns it shall be the duty of the railway companies to erect and maintain at every point where a public highway crosses at grade, and on which line trains are operated, a sign, visible for 100 feet on each side of its track with the words, "Main Line—Danger—Stop," in letters at least six inches in height.

4. Any driver of any vehicle included in this act and any person, firm or corporation, violating the provisions of this act, shall be fined not exceeding $10 for each offense; provided that this act shall not apply to electric railways.

Here *is* What One Farmer Says About Good Roads

ROADS are of such importance that they may be compared to our lives; they are both good and bad; they are smooth, even, level, wide and full; they are hilly, narrow and winding; dangerous, shadowy and bright; and they show the effects of environment and care, even as we. They are the means of our life, for over them passes the food which must keep the people of the cities alive.

Without roads cities could not survive, and countryfolk would be without many of the present necessities, comforts, and luxuries of life, which they are now able to enjoy. They are the connecting link between the city business man, the manufacturer and the farmer, dairyman, the producer of food. They alone make it possible for both country and city to live up to our present standard of living and they will be largely responsible for any rise which may take place in that standard. Who, then, can place a value on roads, and who is great enough to say what their true service to mankind is? Can any man picture a country or a land without roads?

A good man sets an example; a good road is likewise an example; and as we have too few good men, so have we too few good roads. Only when we find a travelable road going past every farm, through every village and city, will it be time to cease talking good roads.

Rocky Mount-Tarboro Highway Being Hardsurfaced

(Continued from page 4)

located in South Rocky Mount near the shops of the Atlantic Coast Line Railroad thus making a haul of approximately two miles to the job. The hauling of this material, which was sublet to a local contractor, is done in White trucks. The asphalt surfacing is rolled first by a 3 wheel roller weighing ten tons and this is followed by a tandem roller weighing five tons, the latter rolling at an angle and ironing out the marks made by the larger roller. Very satisfactory results are being obtained and the portion of the pavement that has been completed presnets a smooth, even riding surface, a quality by which the majority of people judge a good road.

The negro laborers engaged in spreading the hot asphalt mixture as it comes from the trucks have made an ingenious use of old rubber tire casings. The photograph accompanying this article shows clearly how the casings have been cut into sections and tied to the feet of the laborers to overcome the heat from the asphalt.

Being located in the First District, Project No. 125 comes under the general supervision of J. C. Gardner, District Engineer, while it is in direct charge of B. W. Davis, Resident Engineer. The asphalt work is being done under the inspection of L. Z. Morse.

STATUS OF FEDERAL AID WORK IN NORTH CAROLINA

Projects Under Construction

"H S" denotes any type of hard surfaced road.

"G" denotes any type of gravel sand-clay, or topsoil road.

NO.	COUNTY	LENGTH	TYPE	APPROXIMATE COST	BEGUN	CONTRACTOR
15	Guilford	4.205	H	$ 5,441.75	9—1–17	County Commissioners.
16	Haywood	14.27	G	64,705.05	7–26–19	County Commissioners.
17	Wilkes	17.6	G	101,386.08	10–15–18	County Commissioners.
61	New Hanover	2.186	G	234,841.39	7–12–20	C. W. Lacy.
66	Haywood	6.18	G	105,296.45	9–15–20	O'Brien Construction Co.
69	Transylvania	9.348	G	231,409.04	3–25–20	Allport & Alexander Construction Co.
70A	Jackson	4.83	G	150,081.11	8–18–20	Wright & Nave.
75	Columbus	7.06	G	66,605.38	12—9–20	County Commissioners.
86A	Martin-Bertie	3.09	G	98,454.67	2–25–20	State Forces.
86B	Martin-Bertie	--------	Bridges	332,308.83	3–19–21	Boyle-Robertson Construction Co.
94A	Mitchell	5.04	H S	190,375.13	6–22–20	Gibson Construction Co.
99B	Chatham	21.82	G	259,931.59	11–19–20	J. T. Plott—Atlantic Bridge Co.
120	Bladen	23.67	G	105,688.55	2–16–21	J. A. Marrow—P. R. Ashby.
125A	Alleghany	4.99	G	153,899.13	11–22–21	W. E. Graham.
127	Wilson	7.63	G	33,780.45	3—5–21	County Commissioners—Lee J. Smith

Projects Completed

NO.	COUNTY	LENGTH	TYPE	APPROXIMATE COST	COMPLETED	CONTRACTOR
1*	Mecklenburg	--------	Bridge	$ 59,224.90	9—5–18	C. W. Requarth & Co.
2*	Henderson	7.75	G	33,141.74	12–17–19	State Convict Labor.
3*	McDowell	2.85	G	24,405.73	12–17–19	County Commissioners.
4	Craven	9.46	G	21,089.23		County Commissioners.
5*	Burke	8.03	G	19,888.05	11–1–19	County Commissioners.
8*	Cumberland	13.46	G	62,800.71	6–20–21	County Commissioners.
9*	Polk	12.78	G	68,175.45	4–15–21	County Commissioners.
11*	Lenoir	1.78	H S	56,893.18	1–25–21	West Construction Company.
12*	Wayne	8.62	G	26,727.98	11—2–20	County Commissioners.
13*	Wayne	12.573	G	101,467.23	12–1–21	County Commissioners.
14*	Halifax	8.01	G	19,017.83	8–20–29	State Convict Labor.
18*	Alexander	9.8	G	66,446.49	3–31–21	County Commissioners.
19*	Rockingham	8.21	G	32,759.36	11–11–19	County Commissioners.
20*	Yadkin	6.41	G	25,146.45	7–26–20	County Commissioners.
21*	Person	7.675	G	25,911,04	3–15–20	County Commissioners.
22A*	Alamance	1.196	H S	30,103.48	6–27–19	County Commissioners.
22B*	Alamance	8.3	H S	290,179.36	8–19–21	Powell Paving and Construction Co.
23*	Burke	7.68	G	42,873.90	11—1–20	Lovelady Township Forces.
24*	Wake	4.24	H S	127.840.21	11–30–19	W. W. Boxley & Co.
25*	Person	8.175	G	101,537.51	10–20–20	County Commissioners.
26*	Davidson	8.41	G	14,115.96	10—1–19	County Commissioners.
27A*	Orange	8.235	G	53,945.73	4–23–21	W. S. & L. A. Crawford.
29*	Union	8.655	G	58,949.25	4—8–21	County Commissioners—J. S. Stearns.
30*	Mecklenburg	6.304	H S	102,551.35	3–31–21	County Commissioners.
31*	Buncombe	3.1	H S	70,174.88	10–24–19	County Commissioners.
33	Montgomery	3.72	G	15,246.71	6—8–21	County Commissioners.
34	Wayne	--------	Bridge	50,798.00	10—8–21	Roanoke Bridge and Iron Works, Inc.
35*	Forsyth	1.87	H S	59,867.61	2–25–20	County Commissioners.
36*	Durham	3.46	H S	115,075.57	12–15–19	R. G. Lassiter & Co.
37*	Gaston	10.38	H S	167,173.23	12–28–21	County Commissioners.
38*	Rockingham	10.92	G	46,809.92	9–17–20	County Commissioners.
38A	Caswell	6.67	G	50,907.23	7—6–21	Bolton Construction Co.
39*	Union	10.61	G	74,337.71	4—9–21	County Commissioners—J. S. Stearns.
40*	Union	4.287	G	18,434.20	12–11–20	County Commissioners.
41	Watauga	8.95	G	94,681.29	11–10–21	County Commissioners.
42*	Stanly	11.67	G	80,922.15	9–10–20	Gibson Construction Co.
43*	Beaufort	2.2	H S	95,089.12	5–11–20	Simmons Construction Co.
44*	Granville	4.57	G	51,377.43	4–20–21	T. W. Chandler—P. R. Ashby.
45*	Buncombe	7.852	H S	359,777 28	7–23–21	H. A. Wells-Asheville Const. Co.—Asheville Paving Co.
47*	Guilford	4.607	H	162,689.83	4—8–21	County Commissioners.
48A*	Northampton	5.804	G	60,620.51	10–30–20	Virginia Contracting Co.
48B	Northampton	2.69	G	44,749.65	10—4–20	Porter & Peck—A. C. House.
49*	Lenoir	6.017	H S	199,872.19	6—1–21	T. H. Gill & Co.—West Construction Co.
50*	Guilford	2.65	H S	101,596.44	12–31–20	County Commissioners.
51*	Guilford	2.26	H S	87,603.12	9–27–20	County Commissioners.
52*	Cabarrus	8.986	G	162,399.61	3–22–21	Gibson Construction Co.—J. E. Lane.
53*	Lenoir	7.234	H S	246,838.20	2–10–21	T. H. Gill & Co.—West Construction Co.
54*	Wake	6.811	H S	239,736.26	8–23–20	R. G. Lassiter & Co.
55A*	Mecklenburg	6.008	H S	196,899.73	12–28–20	Simmons Construction Co., Inc.
55B*	Mecklenburg	4.59	H S	188,445.18	8–13–21	Simmons Construction Co., Inc.
56*	Forsyth	5.868	G	47,709.31	10–29–20	C. B. Hester—Luten Bridge Co.
57	Rowan	6.75	G	72,549.27	4–22–21	W. E. Graham—R. M. Hudson Co.
58	Johnston	6.018	G	69,453.50	5–20–20	P. R. Ashby.
59	Columbus	11.025	G	106,872.26	1–26–22	County Commissioners.
60	Lenoir	7.88	H S	259,445.25	4–00–22	T. H. Gill & Co.—West Construction Co.
62	Buncombe	3.43	H S	139,191.32	11–00–21	H. C. McCrary, Inc.—Asheville Construction Co.
63*	Buncombe	3.76	H S	167,933.55	9–20–21	Allport & Alexander Construction Co.—H. C. McCrary, Inc.—Asheville Paving Co.

STATUS OF FEDERAL AID WORK IN NORTH CAROLINA---*Continued.*

Projects Completed, (Continued.)

NO.	COUNTY	LENGTH	TYPE	APPROXIMATE COST	COMPLETED	CONTRACTOR
65*	Pitt	9.57	G	99,181.06	10-20-21	Porter & Peck.
67*	Nash	8.81	H S	384,126.08	4-20-21	R. G. Lassiter—Atlantic Bridge Co.
68	Sampson-Harnett	27.4	G	305,225.54	6-24-22	P. R. Ashby—F. L. Grant, Inc.
71	Durham	6.69	H S	319,153.39	10-26-21	State Forces.
72*	Anson	3.896	G	70,470.89	3- 4-21	Gibson Construction Co.—J. A. Kreis & Co.
73*	Nash	8.73	G	159,913.16	4-10-22	Porter & Boyd.
74A*	Stanly	2.803	G	25,537.45	8-20-20	County Commissioners.
74B	Stanly	4.92	G	63,411.26	5- -21	County Commissioners.
76*	Cabarrus	1.35	H S	54,583.76	10-29-20	R. M. Hudson & Co.
77*	Rutherford	2.206	H S	100,159.44	9—5-21	E. T. Belote.
78A*	Rutherford	9.64	G	88,230.71	8—3-21	Ross Brothers.
78B*	Rutherford	10.26	G	71,056.48	8—3-21	Ralph E. Oliver.
79*	Cleveland	1.645	H S	67,063.64	10-30-20	Noll Construction Co.
80A*	Montgomery	16.6	G	226,516.20	6-20-21	County Commissioners.
80B*	Montgomery	11.07	G	65,145.02	10-25-21	Lee J. Smith Const. Co.—P. R. Ashby.
81	Pender	26.11	G	273,439.45	12- -21	Porter & Boyd.
82	Davidson	4.54	G	59,983.71	12-18-20	Heilig & Sherrill.
84A	Burke-McDowell	8.33	G	128,193.76	8—3-21	J. A. Kreis & Co.
84B*	McDowell	6.76	G	109,659.49	8—1-21	J. A. Kreis & Co.
85*	Davie	8.28	G	58,756.89	9-26-20	W. E. Graham.
90*	Pamlico	12.03	G	127,981.78	9-16-21	Eagle Engineering Co.
91*	Surry	10.68	G	113,805.84	6-27-21	W. E. Graham—R. W. Curtis & Co.
92*	Surry	10.38	G	133,141.03	6-20-21	W. E. Graham—R. W. Curtis & Co.
93	Franklin-Warren	19.8	G	192,993.57	9-25-20	Chandler & Ragland—Stearns Bros.
96	Yancey	2.95	G	82,653.12	1-10-22	Gibson Construction Co.
98A	Moore	20.53	G	259,240.38	5-31-22	J. T. Plott—J. E. Lane & Co.
98B	Moore	8.75	G	41,055.46	3—8-22	Lee. J. Smith Construction Co.
98C	Lee	4.53	G	18,240.64	10-29-21	Gibson Construction Co.
99A	Chatham	12.65	G	126,717.70	8-11-21	T. W. Chandler & State Forces.
100	Avery	14.00	H S	272,089.78	3-20-22	Southern Dray Co.
101A*	Randolph	10.04	G	123,893.99	8-12-21	S. L. Davis—J. A. Kreis & Co.
101B	Randolph	9.64	G	107,928.75	3-6-22	J. T. Plott—Hanford Bros.
103*	Duplin	11.32	G	111,931.05	10-20-21	County Commissioners.
105*	Hoke	9.8	G	95,501.80	10-25-21	Jameson Brothers—George, Hankins & George.
107	Madison	2.46	G	70,901.40	10- -21	Southern Dray Co.
109*	Burke	3.58	G	55,191.64	5-21-21	C. E. Teague.
111*	Forsyth	12.22	G	94,447.10	8-17-21	C. B. Hester—Heilig & Sherrill.
112	Caswell	11.93	G	147,065.71	11—2-21	J. M. Gregory & J. E. Lane & Co..
114*	Rowan	2.543	H S	83,587.02	3-17-21	R. M. Hudson & Co.
116*	Stanley Montgom'	--------	Bridge	199,614.80	1—9-22	Cornell-Young Co.
117	Wilson	6.25	G	41,828.93	3-21-22	County Commissioners—Lee J. Smith.
121*	Stokes	11.60	G	108,519.62	1-14-22	Jameson Bros.—Rogers & Shumway.
129	Richmond	17.28	G	77,507.48	12- -21	Mulligan & Roach.
136*	Davie	6.99	G	61,733.04	12—4-21	Chandler & Ragland—Hagedorn Const. Co.

*Final Settlement Made With Federal Government.

STATUS OF STATE WORK IN NORTH CAROLINA

Projects Under Construction

NO.	COUNTY	LENGTH	TYPE	APPROXIMATE COST	BEGUN	CONTRACTOR
100	Beaufort	10.50	H S	$ 369,777.70	8-23-21	W. T. Hadlow.
113	Chowan	10.32	G	40,975.73	2—1-22	Nello L. Teer —P. R. Ashby.
114	Chowan	10.00	G	45,064.09	1—4-22	Battershill & Goode—Chandler & Ragland.
125	Edgecombe	15.11	H S	428,438.76	2-28-22	R. G. Lassiter & Co.
137	Halifax	5.67	H S	124,736.97	10-31-21	O. F. Leighton—A. C. House.
138A	Halifax-Northampton	12.59	G	131,712.13	5—1-22	Nello Teer—Richards Bros.
139	Halifax	--------	Bridge	18,436.66	10-11-21	Chandler & Ragland—Porter & Peck.
140	Halifax	--------	Bridge	10,542.60	5-5-22	Von Glahn & Talbott.
151	Hyde	4.30	G	71,422.78	12-10-21	C. W. Lacy—Porter & Peck.
154	Martin	11.27	H S	394,090.74	4-17-22	Sou. Willite Paving Co.—O. F. Leighton, Inc.
155	Martin-Pitt	20.00	G	98,176.65	1-12-22	J. P. Dicus—P. R. Ashby.
159	Nash	11.22	G	89,942.43	1—2-22	J. A. Kreis & Co.
160	Franklin-Wake-Nash	9.83	G	53,722.95	1.27-21	Chandler & Ragland—Southern Dray Co.
166	Northampton	0.47	G	17,954.75	3-20-22	W. D. Murray-Sadler Corp.
167	Northampton	20.48	G	87,294.90	7-17-22	Virginia Contr. Co. —Bacon & Moore.
175	Pasquotank	9.50	H S	217,405.72	4—6-21	County Commissioners.
183B	Pitt	--------	Bridge	$ 32,343.30	3-27-22	B. J. Boyles.
185	Pitt	14.35	G	31,069.72	3-28-22	J. A. Marrow.
186	Pitt	9.75	H S	260,816.60	9-20-21	Cheatwood & Driscoll.
191	Tyrell	6.91	G	57,934.41	1.20-22	C. W. Lacy—M. M. Jones.
195	Washington	15.18	G	65,619.35	2-27-22	L. M. Lee & Co.—B. J. Boyles.
196	Washington	14.93	G	82,099.60	5-15-22	W. H. Thompson—Nello Teer.
200	Carteret	13.68	G	79,629.00	7-21-22	Eagle Eng. Co.—Batson-Cooke Co.
210	Craven	8.34	H S	287,919.39	4—3-22	West Construction Co.—A. P Gilbert.
211	Craven	9.93	H S	262,673.20	1-30-22	Union Paving Co.
218	Wayne-Duplin	16.06	G	80,804.50	8—4-21	C. W. Lacy.
219	Duplin-Lenoir	15.60	G	148,339.29	6—1-21	Chitwood & Palmer

STATUS OF STATE WORK IN NORTH CAROLINA---*Continued*

Projects Under Construction (Continued)

NO.	COUNTY	LENGTH	TYPE	APPROXIMATE COST	BEGUN	CONTRACTOR
227	Greene	6.81	H S	238,113.70	12-19-21	West. Const. Co.—Union Paving Co.
245	Jones	15.76	H S	244,737.90	3-22-22	Hyde & Baker.
263	Pamlico	12.03	H S	289,324.20	3-27-22	Union Paving Company.
264	Craven-Pamlico	0.14	H S	27,156.25	7-24-22	Rhyne & Kitchen
272	Sampson	16.47	G	98,807.39	6-19-22	R. E. Martin-Striblin-Stauddy & Newell.
280	Wayne	10.01	H S	311,352.36	11-28-21	Union Paving Co.
281	Wayne	--------	Bridge	22,484.88	10- -21	P. R. Ashby.
291	Wilson	7.63	H S	203,493.18	1-17-22	P. R. Ashby.
300	Bladen	11.99	G	65,178.90	4—8-22	T. W. Chandler—Nello Teer.
301	Bladen	13.17	G	82,028.21	11-21-21	J. F. Mulligan—Powell Paving & Const. Co.
312	Brunswick	9.77	H S	347,319.68	7—5-22	Alabama Conc. Prod. Co.—Batson-Cooke Co.
313	Brunswick	3.44	H S	105,389.85	3-15-22	Sou. Willite Paving Co.—Roanoke Bridge & Iron Works.
314	Brunswick	15.82	G	99,326.45	2-23-22	Hagedorn Const. Co.
325	Columbus	11.22	G	105,258.23	11—3-21	J. A. Kreis-Cornell-Young Co.
326	Columbus	13.61	G	195,838.19	5-23-22	J. T. Plott—J. A. Kreis & Co.
327	Columbus	5.2	G	38,269.44	6-21-22	J. A. Kreis.
338	Cumberland-Sampson	--------	Bridge	26,233.99	10-28-21	Roanoke Bridge & Iron Works.
339	Harnett-Cumb'l'nd	--------	Bridge	16,524.75	11-30-21	Porter & Boyd.
340	Cumberland	11.07	H S	381,032.02	6-15-22	Alabama Conc. Prod. Co.—Hobbs & Peabody.
364A	Onslow	9.95	G	44,631.40	3-14-22	R. E. Martin.
375	Pender	15.56	G	72,522.92	11—1-21	A. W. McClay.
376	Pender	7.64	G	94,757.85	11-11-21	C. G. Kershaw Const. Co.—Cornell Young Co.
377	Pender-Duplin	1.61	G	76,985.70	3-22-22	R. E. Martin-Hazell-Conerat-Quist Co.
378	Pender	14.12	H S	213,502.96	7-19-22	C. W. Lacy.
379	Pender	10.00	H S	100,000.00	5-22-22	State Forces
388	Robeson	3.35	H S	137,009.40	11-10-21	C. W. Lacy—Roanoke Bridge & Iron Works.
389	Roberson-Colum	1.56	G	83,463.38	10-26-21	L. A. Chitwood.
400	Chatham	--------	Bridge	57,420.22	4-14-22	R. M. Walker & Co.
409	Durham	0.5	H S	6,140.64	1-13-22	J. P. Dicus.
410	Durham	2.3	H S	83,921.97	2-13-22	C. D. Riggsbee.
411	Durham	5.81	H S	211,574.92	9—1-21	Hutton Eng. & Const. Co.
420	Franklin	1.56	H S	55,421.30	7-11-22	Chandler & Ragland.
427	Granville	5.12	H S	159,097.62	12—1-21	R. G. Lassiter & Co.
428	Granville	4.19	H S	142,637.77	7-14-22	Pittman Const. Co.
436	Harnett	21.19	G	144,318.14	6-28-21	C. G. Kershaw Const. Co.—Hobbs & Kitchen.
445	Lee	5.91	G	18,692.85	5-20-22	C. B. Hester.
446	Lee	5.90	H S	197,188.22	5-24-22	Atlantic Bitulithic Co.—O. A. Mann & Co.
453	Orange	--------	Bridge	33,706.80	4-15-22	Geo. W. Kane.
454	Orange	4.29	H S	192,006.15	6-18-21	Elliott, Sholes & Teer.
455	Orange	4.19	G	46,415.77	11-28-21	J. F. Mulligan Const. Co.—P. R. Ashby.
456	Orange	9.00	G	37,459.07	1—7-22	Crawford & Crawford—Nello Teer.
473 {F A 146	Vance	7.83	H S	265,546.60	7-11-22	R. G. Lassiter & Co.
481	Wake	7.20	H S	252,925.15	1-24-22	Union Paving Co.—P. R. Ashby.
482	Wake	6.64	H S	191,669.21	12—8-21	R. M. Hudson Company.
483	Wake	0.54	H S	19,989.75	5-15-22	C. D. Riggsbee.
492	Warren	4.49	H S	100,436.13	4-10-22	Porter & Peck—A. C. House.
501	Alamance	13.10	G	32,627.10	12—7-21	W. M. Shook—Hanford Bros.
502	Alamance	17.43	G	138,629.97	7-17-22	W. E. Graham—Hanford Bros.
503	Alamance	--------	Bridge	59,450.38	7-17-22	Atlantic Bridge Co.
511	Caswell	14.8	G	74,192.58	12-12-21	White & Simpson—C. B. Hester.
525	Davidson	10.24	H S	363,141.68	12-23-21	Elliott & Sons & Boggs—Austin Bros. Bridge Co.
526	Davidson	3.77	H S	130,826.19	3—4-22	Hagedorn Const. Co.—Heilig & Sherrill.
532	Guilford	11.70	H S	387,499.20	2—1-22	Elliott-Sholes Co.
533	Guilford-Forsyth	10.59	H S	427,997.62	7-11-21	Royer-Ferguson Const. Co.
544	Hoke	10.45	G	32,445.49	5-16-22	O. A. Mann & Co.—J. T. Pigg.
566	Moore	7.14	G	61,380.66	3—6-22	Gibson Const. Co.—Nello Teer.
567	Moore	2.96	G	7,600.43	4-11-22	C. E. Teague.
577	Randolph	13.37	H S	411,375.77	4-18-22	Royer-Ferguson Co., Inc.—J. L. Brinkley.
588	Rockingham	7.98	H S	266,498.43	4-11-22	Cheatwood & Driscoll.
593 {F A 38	Rockingham-Caswell	17 60	H S	525,393.22	7-11-22	J. A. Kreis
600	Alexander	9.3	G	12,530.98	5-26-22	Bolton Construction Co.
601	Alexander	3.07	G	33,630.45	4—3-22	Gus Ginn, Inc.—R. M. Thurmond.
606	Stanley-Anson	--------	Bridge	54,759.32	3-23-22	Concrete Steel Bridge Co.
607	Anson	6.39	G	40,517.29	3-21-22	Geer & Wilson—Booz-Lloyd & Co.
614 {F A 144	Cabarrus	9.20	H S	350,085.07	6-20-22	A. L. Harris-Oliver & Costello Bros.
622	Catawba	10.85	H S	354,684.88	1-23-22	Union Paving Co.
629	Catawba	8.40	H S	268,662.48	6—5-22	A. L. Harris—R. M. Thurmond & Co.
630	Gaston	3.02	H S	98,392.36	10-21-21	W. F. McCanless.
632	Gaston	9.5	H S	291,868.94	1—2-22	Davis-Wilcox Const. Co.
638	Iredell	7 88	H S	244,509.30	10-12-21	Thompson-Caldwell Co.
639	Iredell	10.59	H S	387,448.42	1-2-22	R. M. Hudson Co.—Luten Bridge Co.
647	Lincoln	7.10	H S	250,108.15	6—5-22	A. L. Harris—R. M. Thurmond & Co.
653	Mecklenburg	8.84	H S	308,182.44	1-16-22	Union Paving Co.—Luten Bridge Co.
654	Mecklenburg	10.1	H S	302,887.09	4-3-22	Lampton & Burks.
655	Mecklenburg	1.57	H S	62,027.68	12-21-21	Speed-Parker Co., Inc.—Luten Bridge Co.
657	Mecklenburg	13.8	G*	20,000.00	12—8-21	State Forces.

STATUS OF STATE WORK IN NORTH CAROLINA---*Continued*

Projects Under Construction (Continued)

NO.	COUNTY	LENGTH	TYPE	APPROXIMATE COST	BEGUN	CONTRACTOR
661	Richmond	9.76	G	$ 40,683.41	7-18-22	McDonald & Brooks.
670	Cabarrus-Rowan	4.53	H S	142,221.53	6-29-22	Southern Construction Company
677	Scotland-Robeson	7.11	H S	283,460.21	4-26-22	P. R. Ashby—Chitwood & Palmer.
695	Union	4.5	H S	123,865.28	1-23-22	Redmon Const. Co.
700	Alleghany	7.90	G	132,297.33	6-23-21	W. E. Graham.
701	Alleghany-Wilkes	8 00	G	153,863.60	6-16-21	W. E. Graham.
710	Ashe	3.14	H S	142,687.93	9—8-21	Pittman Const. Co.
719	Caldwell		Bridge	5,343.25	6-26-22	Cottrell & Howard.
724	Caldwell	4.66	G	51,890.66	5-9-22	County Road Comsrs—R. M. Thurmond & Co.
725	Caldwell	2.4	G*	10,000.00	12-29-21	County Commissioners.
731	Davie	5.46	H S	195,393.11	3-13-22	G. R. Martin-Heilig & Sherrill.
741	Forsyth	8.90	H S	315,025.81	7-27-22	Hardaway Construction Company.
742{F A 137	Forsyth	10.62	H S	385,127.60	6-20-22	Harris Const. Co.
750	Stokes	14.86	G	93,054.48	9-15-21	J. F. Mulligan Const. Co.—Lee J. Smith.
751	Stokes	7.25	G	31,746.00	10—4-21	W. E. Graham.
760	Surry-Wilkes	6.91	G	24,387.66	2-10-22	W. E. Graham.
780	Wilkes	18.00	G*	25,000.00	7-25-21	J. F. Mulligan.
781	Wilkes	14.50	G*	30,000.00	7-25-21	J. F. Mulligan.
782	Wilkes	5.97	H S	184,614.65	3-29-22	Hyde & Baxter.
783	Wilkes-Watauga	34.40	G*	80,000.00	9—2-21	Chandler & Ragland.
790	Yadkin	10.12	H S	308,123 42	4-24-22	Pittman Const. Co.
800	Avery	5.84	H S	198,827.02	7-24-22	O'Brien Const Co.—J. A. Kreis.
801	Avery	0.99	H S	22,350.24	3-24-22	Geer & Wilson.
811	Burke	6.0	H S	189,412.41	1-13-22	Southern Dray Co.
823	Cleveland	2.0	H S	81,234.01	1—2-22	Southern Paving Co.—Z. B. Weathers & Son.
833	Henderson	10.22	G	38,412.44	1—3-22	S. L. Davis Const. Co.—Asheville Const. Co.
845	McDowell	7.19	G	132,177.93	9—6-21	J. W. Stapp Const. Co.—Praytor, Howton Wood Const. Co.
846	McDowell	10.06	G	204,680.74	9-12-21	Asheville Const. Co.—W. T. Taylor Const. Co.
855	Mitchell	4.97	H S	174,393.78	9-12-21	Fiske-Carter Construction Co.
855B	Mitchell		Bridge	7,454.15	4—6-22	Luten Bridge Co.
856	Mitchell	4.0	H S	239,005.80	3-20-22	Porter & Boyd—L. J. Chandler & Co.
860	Mitchell	5.58	H S	152,908.42	4-21-22	J. F. Mulligan—W. H. Anderson Const. Co.
866	Polk	5.96	H S	180,393.40	4—3-22	Dunn & Woodall—Henry Const. Co.
877	Rutherford	9.79	G	64,563.73	5-31-21	Geer & Wilson.
878	Rutherford	6.55	G	50,913.50	9-22-21	Michaux Const. Co.—Geer & Wilson.
979	Rutherford		Bridge	5,737.38	1—9-22	Austin Bros. Bridge Co.
880	Rutherford		Bridge	24,679.43	4—4-22	Austin Bros. Bridge Co.
903	Buncombe	2.58	H S	100,399.47	4-10-22	Asheville Paving Co.—R. C. Stevens.
904	Buncombe	1.60	H S	81,079.35	3-13-22	Asheville Paving Co.—R. C. Steven.s
910	Cherokee	7.56	G	76,743.59	5-24-21	Ross Bros.—W. T. Moore Conc. Prod. Co.
911	Cherokee	10.33	G	84,475.38	10-25-21	H. A. Wells—Southern Dray Co.
920	Clay	4.8	G	54,875.81	1—9-22	E. A. Wilson & Co.—W. T. Moore Conc. Prod.Co
921	Clay	12.37	G	123,929.52	10-24-21	Lee J. Smith Const. Co.—W. T. Moore Conc. Products Co.
930	Graham	12.90	G	130,522.00	10-15-21	Lee J. Smith Const. Co.—C. M. Dicus.
940	Haywood	7.13	H S	126,082.00	4-14-22	Alexander & Patton—H. A. Brown & Co.
950	Jackson	7.56	G	145,313.30	6-13-21	Wright & Nave—O'Brien Const. Co.
951	Jackson	11.85	H S	249,546.00		R. H. Wright & Sons—W. T. Moore Conc. Pro. Co.
960	Macon	4.97	G	69,100.57	6—6-21	J. T. Plott—J. E. Lane & Co.
961	Macon	4.77	G	58,340.59	12—5-21	J. T. Plott—J. E. Lane & Co.
962	Macon	13.58	G	171,310.04	4-24-22	O'Brien Const. Co.—Griffin Const. Co.
970	MadisonYancey	13.80	G	267,378.26	10-11-21	R. H. Wright & Sons—O'Brien Const. Co.
980	Macon-Swain	17.84	H S	350,175.11		Costello Bros.—Condon & Condon.
990	Transylvania	8.87	H S	151,238.89	6—5-22	Sam L. Davis Const. Co.—R. C. Stevens.

Projects Completed

NO.	COUNTY	LENGTH	TYPE	APPROXIMATE COST	BEGUN	CONTRACTOR
209	Craven	2.65	H S	$ 15,688.21	2-15-22	Eagle Engineering Co.
500	Alamance	5.22	G	32,732.20	1-17-22	W. W. Tuck & Son—A. M. Hazell, Connerate—Quist Const. Co.
505	Alamance	0.42	H S	15,346.40	6-23-22	Hedrick Const. Co.
692	Union	2.28	H S	65,366.67	12-28-21	Redmon Construction Co.
722	Caldwell	7.00	G*	12,000.00	1-18-22	County Forces.
844	McDowell	1.80	H S	57,048.42	12-28-21	Bolton Construction Co.
942	Haywood	0.57	G	5,294.46	2—1-22	O'Brien Construction Co.

*Reconstruction only.

PROJECTS UNDER CONTRACT

NO.	COUNTY	LENGTH	TYPE	APPROXIMATE COST	CONTRACTOR
132	Gates	9.73	G	$ 63,921.00	J. A. Marrow
145	Hertford	12.88	G	86,379.70	Nello Teer—Atlantic Bridge Co.
173	Perquimans-Pasquetank	7.22	H S	239,444.70	Williams & Williams
236{F A 143	Johnson	14.83	H S	475,321.55	R. G. Lassiter & Co.
316	Brunswick	12.12	G	80,068.72	B. F. Price—Batson-Cooke Co.
342	Cumberland	5.91	H S	177,402.50	A. J. Wardrep

STATUS OF STATE WORK IN NORTH CAROLINA—*Continued*

PROJECTS UNDER CONTRACT (*Continued*)

NO.	COUNTY	LENGTH	TYPE	APPROXIMATE COST	CONTRACTOR
364-B	Onslow	12.84	G	$ 99,819.00	A. W. McClay.
386-7-F A-141-2	Robeson	19.80	H S	647,888.05	James O. Heyworth.
402	Chatham	6.92	G	33,940.28	J. F. Mulligan Const. Co.
419	Franklin	12.82	G	63,021.97	Jamison Bros.—J. M. Gregory.
463	Person	11.24	H S	327,171.35	Porter & Boyd.
484	Wake	8.79	H S	311,629.40	P. R. Ashby-Booz-Lloyd & Co.
493	Warren	3.88	H S	77,866.80	Porter & Peck.
494 {F A 147	Warren	6.21	H S	208,150.01	Clifford Engineering Co.
504	Alamance	5.22	H S	154,127.16	Elliott & Sholes
535	Guilford	7.78	H S	259,357.01	Leakesville Lumber Co.
538	Guilford		Bridge	7,039.01	J. L. Brinkley.
539	Guilford	0.64	H S	21,639.20	R. G. Lassiter & Co.
545	Hoke	10.45	G	58,195.06	O. A. Mann & Co.—A. W. McClay.
569	Moore	18.97	G	97,151.45	Mayfield Construction Co.
602	Alexander	9.28	H S	189,329.80	W. E. Graham
640	Iredell	8.17	H S	181,990.82	W. E. Graham
665	Richmond	5.77	H S	194,501.23	A. J. Wardrep.
694	Union		Bridge	23,549.13	Hagedorn Construction Co.
702-A	Alleghany	7.75	H S	185,483.76	O'Brien Construction Co.–Luten Bridge Co.
764	Surry	1.63	H S	50,558.20	Leakesville Lumber Co.
814	Burke	8.69	G	13,459.60	M. A. Kollock
913	Cherokee	10.33	H S	95.554.80	Mills, Williams Construction Company.
952-A	Jackson	10.22	G	158,845,38	Brooks-Callaway Company
953	Jackson	12.72	G	118.186.75	C. C. McCabe.
954	Jackson	1.68	H S	90,871.77	Mills, Williams Construction Company.
963	Macon	8.68	G	121,355.63	Costello Bros.–Brooks-Calloway Co.

Summary

	NUMBER OF PROJECTS			MILEAGE		APPROXIMATE TOTAL COST		
	H S	G	BRIDGE	H S	G	H S	G	BRIDGE
UNDER CONSTRUCTION								
Federal Aid Projects	2	12	1	9.25	122 38	$ 195.816 88	$1,606.078 89	$ 332,308.83
State Projects	74	68	13	548.43	723 54	16,632 000 37	5,284.931 66	375,117.11
Total Under Construction	76	80	14	557 68	845 92	16,827 817 25	6 891,010 55	707,425 94
UNDER CONTRACT Construction not yet begun								
Federal Aid Projects								
State Projects	19	12	2	136.13	137.04	4,153,836.71	994,345.54	30,588.14
Total Under Contract	19	12	2	136.13	137.04	3 882,290.11	994.345.54	30,588.14
COMPLETED								
Federal Aid Projects	29	69	3	143.18	640.12	4,745,739.45	5.792 480.49	309,637.70
State Projects	4	3		7.15	12.79	253 449.70	50,026.66	
Total Completed	33	72	3	150.33	652.91	4,999.189 15	5.842 507 15	309,637.70

Total mileage of Hard Surface work under construction or contracted for		693.81
Total mileage of Topsoil, Sand Clay or Gravel work under construction or contracted for		982.96
Total mileage under construction or contracted for		1,676.77
Total cost of Hard Surface work under construction or contracted for	$	20,981,653.96
Total cost of Topsoil, Sand Clay or Gravel work under construction or contracted for		7,885,356.09
Total cost of Bridge work under construction or contracted for		738,014.08
Total cost of work under construction or contracted for	$	29,339,477.53
Total mileage of Hard Surface work completed		150.33
Total mileage of Topsoil, Sand Clay or Gravel work completed		652.91
Total mileage of work completed		803 24
Total cost of Hard Surface work completed	$	4,999,189.15
Total cost of Topsoil, Sand Clay, or Gravel work completed		5,842,507.15
Total cost of Bridge work completed		309,637.70
Total cost of all work completed	$	10.841.696 30

Corrected to August 1, 1922.

The Cash Value *of* Roads

THE congressional commission which has been investigating agricultural problems has issued some illuminating statistics showing the cash value of good roads to the farmer. From farm to shipping point, in 1918, the cost of wagon hauling was approximately 30 cents per ton mile for wheat, 33 cents for corn, and 48 cents for cotton. Over the same route now, but on hard surfaced roads and by means of motor trucks, the cost is 15 cents per ton mile for wheat and corn, and 18 cents for cotton.

That represents a direct saving of more than 50 per cent to the farmer. A farmer who hauled 100 tons of wheat and corn over hard roads ten miles to his shipping point by truck last year did so at a saving of approximately $150 compared with his expense in taking the same crop to market with a wagon over dirt roads in 1918. That is the cash value of the good road to the farmer, not considering the daily or weekly trips to town, the saving in delivery of his purchases, and the closer contact he has with the outside world.

The city gets its profit in its receipt of fresh farm products, in the more regular and more frequent shopping trips of the farmer and his family, and in the added ease with which city dwellers can find their way into the country for a change of air and scene. Paying such dividends good roads are a good investment at almost any price.—**Chicago Tribune.**

The History *of* "Portland" Cement

(Continued from page 8)

mits a substantial amount to be exported to other countries as well, principally South America and the West Indies.

Cement is an international building material and 32 countries of the world have specifications for portland cement, twenty of which differ in important details from each other. Twenty-five others use the specifications of other countries in assuring the quality of the cement in construction within the country, and many others accept the cement if it passes the tests of the country in which it is made.

In this country there is but a single standard for portland cement, known as the American Engineering Standards Committee **Specification No. 1,** which has been adopted by the American Society for Testing Materials and substantially all of the great technical societies, and by the United States Government. American portland cement manufacturers guarantee their product to conform to this standard.

Tar-mac

MAKES GOOD ROADS

A scientifically prepared coal tar for the construction and maintenance of roads and streets.

Your Inquiries are Solicited

AMERICAN TAR PRODUCTS COMPANY

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Metal Culvert *Concrete Culvert*

Washed and Screened

Sand Gravel Crushed Stone

Conforming to the specifications of the North Carolina State Highway Commission.

Prompt shipments by rail or water

Favorable freight rates to all North Carolina points.

Quotations gladly furnished on request.

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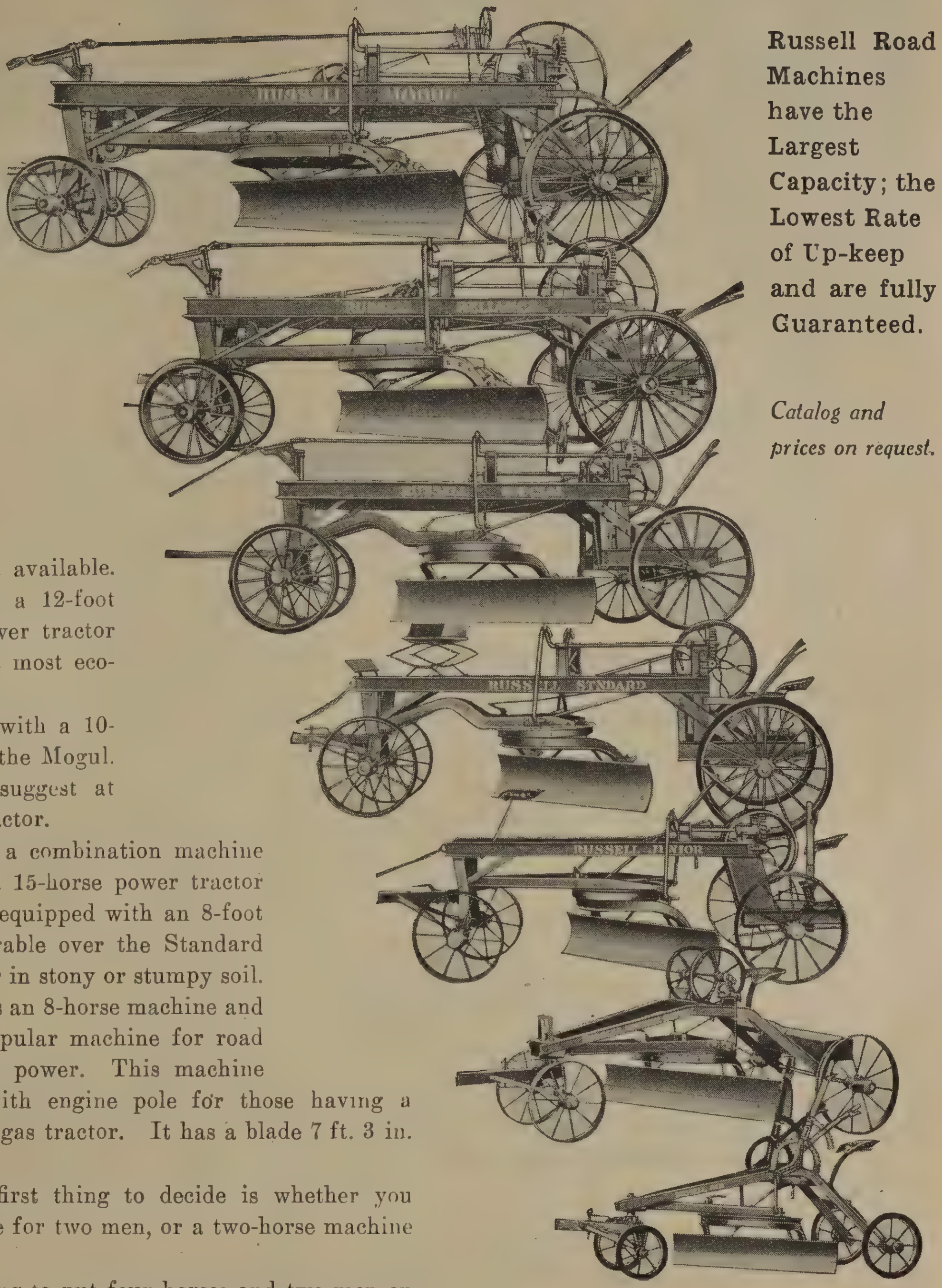
A RUSSELL ROAD MACHINE FOR EVERY NEED



Before deciding upon a road machine let us assist you by suggesting what we consider best for your requirements. We make this offer because we know that this is one of your problems. The first thing to decide upon is whether you want a machine for construction or maintenance; for horse power or tractor power.

For Construction buy the largest machine for which power is available. The *Russell Mogul* with a 12-foot blade and a 25-horse power tractor will construct your roads most economically.

The *Russell Reliance,* with a 10-foot blade, ranks next to the Mogul. With this machine we suggest at least a 20-horse power tractor.

The *Russell Special* is a combination machine for which you may use a 15-horse power tractor or 8 or 12 horses. It is equipped with an 8-foot blade and is often preferable over the Standard for use with animal power in stony or stumpy soil.

The *Russell Standard* is an 8-horse machine and is, no doubt, the most popular machine for road construction with animal power. This machine may also be equipped with engine pole for those having a small 8 to 15-horse power gas tractor. It has a blade 7 ft. 3 in. long.

For Maintenance the first thing to decide is whether you want a four-horse machine for two men, or a two-horse machine for one man.

For those who are willing to put four horses and two men on the grader, the *Russell Junior* will do maintaining work more effectively than any other grader. This machine has a 6-foot blade and may be used for light road construction as well as maintenance.

The *Russell Hi-Way Patrol* grader is built especially for greatest efficiency in patrol and maintenance work with two horses and one man. It is lighter than the Junior and is equipped with a 6-foot blade. Blade is operated by worm and gear lift, giving the finest kind of adjustment.

The *Russell Gem* is the cheapest of the high-framed type machines. It is equipped with 5-foot, one-piece, reversible blade. The blade is operated by lever. It is a one-man, two-horse machine.

Russell Road Machines have the Largest Capacity; the Lowest Rate of Up-keep and are fully Guaranteed.

Catalog and prices on request.

E. F. CRAVEN, "THE ROAD MACHINERY MAN"
STATE DISTRIBUTOR
GREENSBORO, NORTH CAROLINA
COMPLETE LINE OF MACHINES AND REPAIRS IN STOCK

We are Distributors for Virginia, North and South Carolina for the Following New Equipment:

Air Compressors, Locomotives, Street Cleaning tools and machines, Road pumps, Trench pumps, Steam pumps, Sand pumps, Steam, electric and gasoline hoists, Cranes of all types, Fire apparatus, Asphalt tools, Motor trucks, Trailers, Pavers, Building Mixers, Light mixers, Concrete chute systems—complete, Mortar mixers, Saw rigs, Graders, Asphalt pumps and distributors, Dump bodies, Conveyors, Elevators, Road Graders, Crushers, Scarifiers. fiers.

We have a full line of used machinery a great deal of which is owned outright by us and has been fully rebuilt in our own shops in Norfolk.

If you want anything in the way of used machines that must be about as good as new write us.

At this time we have going through our shops, rebuilding, the following:

Ten ton steam roller, Five ton tandem roller, One bag light mixer, 3½ ton Kelly Truck, Monarch Tractor, Three hoisting engines, Two air compressors, Pipe threading machine, 44 ins. engine lathe, 5 ton Alco Truck, 5 drill presses, No. 3. Keystone shovel, one paving mixer, etc., etc., etc.

We have a full line of slightly used plants on which we can save you money.

Let us have your inquiries.

We have a number of good pieces of plant that we will rent to responsible people.

This will save you buying equipment for the small contracts.

We have to rent now: No. 3 Keytone Hoisting engine D. C. 7 x 10, D. D. with boiler. Ten ton steam roller, Five ton tandem roller, 30 h. p. crawler type tractor, Thew Steam shovel, Two small air compressors with gasoline engines, Air compressor with electric motor, 21-S Mixer with boiler, engine, sideloader and tank, One-bag gasoline mixer loader and tank, 1250 yard Asphalt plant-complete.

All above plant is our own property and fully guaranteed.

Write us for terms.

We can use a few good sub-agents in the larger towns in all three states. If you visit contractors and can sell machinery we can put you in position to make some good extra money.

Sixteen years in business — our customers our references

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Permanent Construction

Concrete

Minimum Maintenance

Solves the Road Problem

The concrete road is gaining in favor in all parts of the United States. Whether laid in North or South, East or West, in all varieties of climate and under widely varying conditions, the concrete road is meeting with success and is solving the problem of securing a roadway at reasonable cost that will stand up under modern traffic conditions.

Public approval and appreciation of the concrete road is based upon practical observation as to its extreme utility, reasonable first cost and the almost negligible outlay required for maintenance.

The most important question in road building today is that of maintenance.

The one aim and desire of road officials and engineers has been to find a material, the use of which would keep maintenance charges at a minimum.

In Bellefontaine, Ohio, the maintenance cost of a concrete road put down 20 years ago has averaged only one-fourth of a cent per square yard per year.

In Wayne County, Michigan, the maintenance on 60 miles of concrete road laid 1909 to 1912 was less than one-sixth of a cent per square yard for three years.

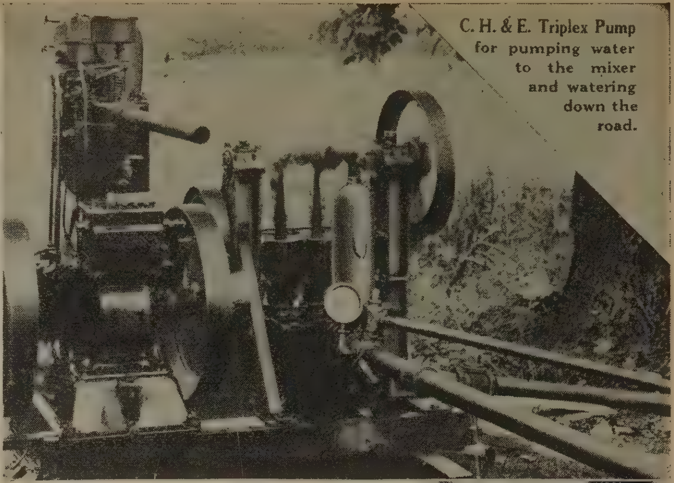
Concrete, therefore, completely answers the maintenance question.

And this combined with reasonable first cost makes it the ideal material for a modern road to meet modern conditions.

CLINCHFIELD PORTLAND CEMENT CORP.

Office and Mills: KINGSPORT, TENN.

HELTZEL STEEL ROAD FORMS "BUILT LIKE A RAIL ROAD"


C. H. & E. Triplex Pump for pumping water to the mixer and watering down the road.

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This Barber-Greene Loader replaced 13 laborers. See one with crawler traction on the Norfolk-Virginia Beach Road.

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Steam Shovels
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Pumps
Stone Loaders
Hoists

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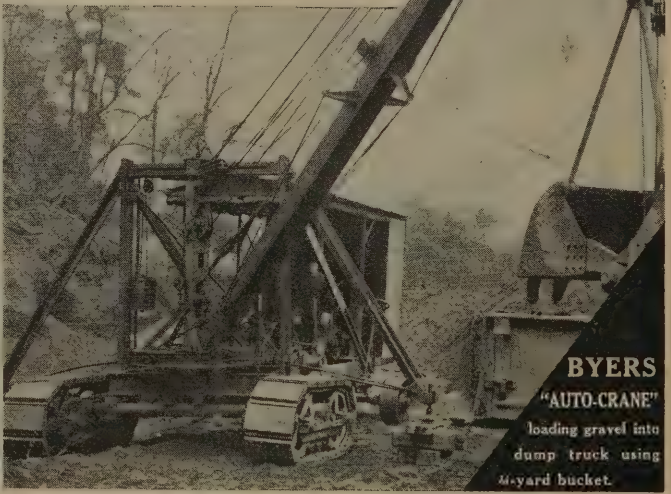
Gasoline Locomotives

Plymouth Gasoline Locomotive Speeding up delivery to the Paver.


BYERS "AUTO-CRANE" loading gravel into dump truck using ¾-yard bucket.

GEO. E. HOPPE, PRES. GRAHAM B. BRIGHT, V.-P. & SALES MGR.

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BAKER MANUFACTURING CO.

BAKER—MANEY WHEELERS

WE ALSO OFFER A FULL LINE OF SLOW SPEED TRAILERS FOR ALL PURPOSES; IN FACT, ANYTHING IT TAKES TO BUILD OR MAINTAIN A STREET OR ROAD.

Fort Fisher Highway, New Hanover Co., N. C. Treated with "Tarvia-B" 1915-17-18-19 and "Tarvia-A" in 1916.

Above is Wrightsville Turnpike, New Hanover Co., N. C. Treated with "Tarvia - A" 1915, and with "Tarvia-B" 1917.

Another vie Fort Fisher Highway.

"The Best Investment The Board Ever Made"

Mr. Addison Hewlett, Chairman of the Board of Commissioners of New Hanover County, N. C., writes, under date of July 25, 1921:

"We have been using Tarvia for surface treating the macadam roads of New Hanover County for the past six years, and we find this treatment satisfactory in every respect.

"Before we started the use of Tarvia we had great difficulty in maintaining our roads, as they became very dusty in dry weather and washed away in wet weather, leaving our road surface full of holes and ruts. Since using Tarvia the surface of the roads has been well protected in all kinds of weather, and today our roads have smooth, hard surfaces and our maintenance problem has been very easily solved. The Tarvia treatment is very inexpensive.

"It is unquestionably the best investment the Board of Commissioners has ever made and the Commissioners would not consider for a moment discontinuing Tarvia on our roads."

Tarvia
For Road Construction Repair and Maintenance

Additional comments on Tarvia are made by R.. A. Burnett, County Superintendent of Roads:

"Tarvia treatments are given to some of our roads every year while other roads, such as the Wrightsville Turnpike, have lasted as long as three years before requiring another treatment.

"These treatments have cost us in the neighborhood of $300 per mile per year and have proved to be the best, easiest and cheapest method of maintaining our roads. We have always had the best of co-operation from your engineers . . .

"We feel that we have a finer system of roads than any other county in the State."

No matter what your road problems may be—new construction, maintenance, or repairs—there is a grade of Tarvia made especially for the purpose.

Write for free illustrated booklet describing the various uses of Tarvia

36th and Grey's Ferry Avenue The *Barrett* Company **Branches in All Leading Cities** TRADE B MARK **PHILADELPHIA, PA.**

FOOTE BUILT THE FIRST PAVER
WITH CATERPILLAR TYPE TRACTION

And having gone entirely through the experimental stage now offers to contractors the perfected "MultiFoote"

CONSIDER THESE FEATURES:

1—No planking or delays in moving, made possible by full length cast steel self-cleaning tread.

2—Absolute one-man control; from high operating platform, thus giving operator full view of all operations.

3—Fast mixing and discharging, due to patented double cone drum

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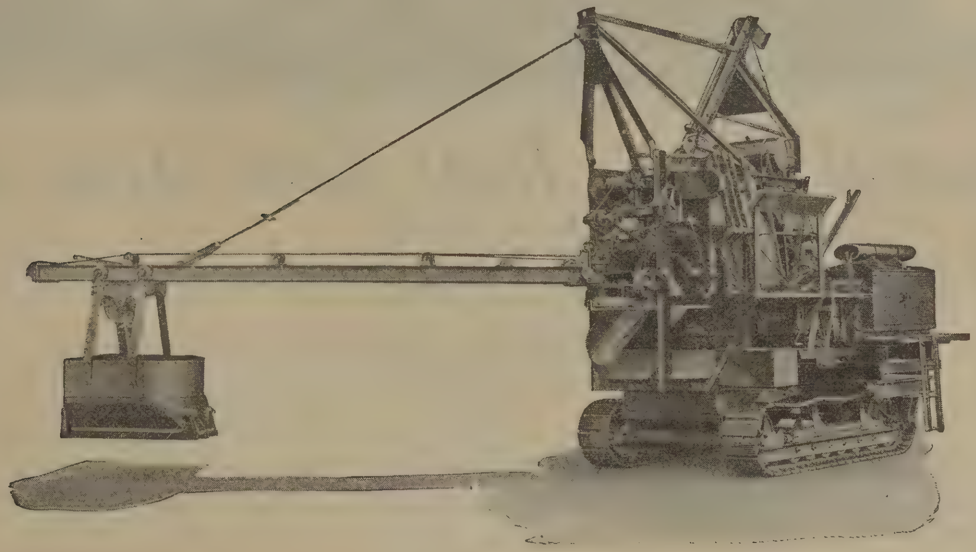

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Built in two sizes---14 E and 21 E, with boom and bucket or gravity chute
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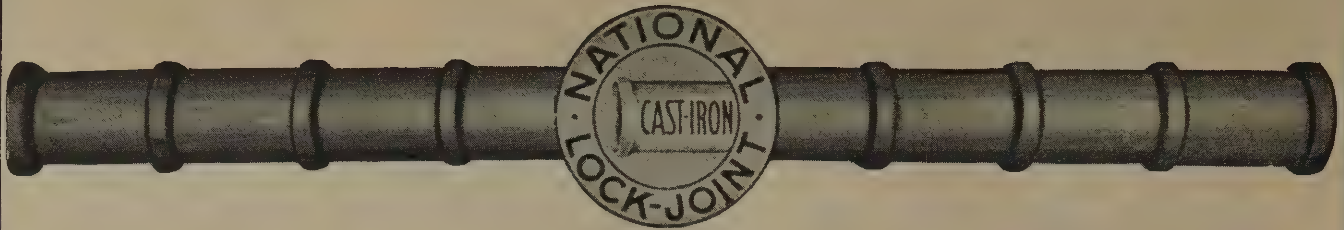
E. F. CRAVEN, "The Road Machinery Man," Greensboro, N. C.



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National Lock-Joint Cast-Iron Pipe

The Pipe *of* Short Units, Long Service *and* Low Costs

The Pipe that locks effectively, that prevents Separation and assures alignment to perfection.

The pipe which solves culvert renewal problems with least expense, greatest efficiency. The pipe that does not rot or disintegrate, the pipe that is mechanically correct and has proved itself the solution of the culvert problem.

CONTRACTORS *and* ENGINEERS, GET THIS:

TWO MEN, without the use of any tools whatsoever, will unload, handle and install all sizes up to and including 36 inches in diameter.

It is as cheap to handle and install as clay pipe WITH NO BREAKAGE LOSS. In shallow trench work the entire culvert can be built up, interlocked and rolled into place in one operation.

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CASTING CO.
Birmingham, - - Alabama

T. B. TURNER & CO.
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For better roads—SLAG

8.103 Miles *of* Penetration

"ENSLEY" & "ALA CITY"

BASIC SLAG

CRUSHED & SCREENED

macadam *on a* water-bound Slag macadam base, Ga. F. A. P. 90.

Prompt Shipments

at favorable "delivered" prices to all points in the south eastern states.

This splendid hard surface highway shows just what can be done when a capable Highway Department and a first class road builder work with a road metal of proved quality.

This project (F. A. P. 90) is in Cook County, Ga. It is known as State Route, No. 7 and was finished in January, 1921, by Kreis & Wardrep (Konxville) contractors. More than 100 miles of this enduring type of paving—Penetration Slag Macadam—have been laid in Georgia, Alabama and Florida in recent years. Almost as many miles more will be laid this year and next under contracts already awarded.

Birmingham Slag Company

Slag Headqaarters for the South

ATLANTA BIRMINGHAM THOMASVILLE

TEXACO

—in North Carolina

North Carolina has constructed about one and a half million square yards of TEXACO ASPHALT pavements, consisting of all types, including Texaco Sheet Asphalt, Texaco Asphaltic Concrete and Texaco Asphalt Macadam.

These pavements have been laid on Federal-Aid and State projects, on county highways and city pavements. They are carrying today North Carolina's heaviest traffic in all parts of the State.

TEXACO ASPHALT pavements in North Carolina are durable, resilient, lasting, waterproof—and economical. Thousands of square yards have been laid on the old macadam and gravel roads of North Carolina, and the State has saved much of the taxpayer's money by utilizing these worn-out highways as foundations for TEXACO ASPHALT pavements.

Another thing: Every city in the United States east of the Rocky Mountains with a population of 155,000 and over (except two) has laid and is getting excellent service from thousands of square yards of TEXACO ASPHALT pavements.

ASPHALT

The Texas Company

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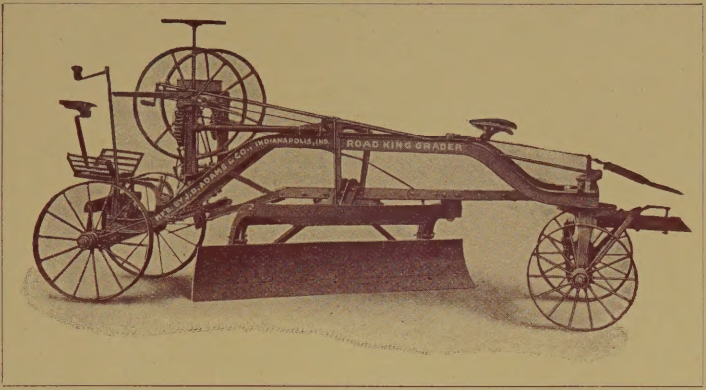
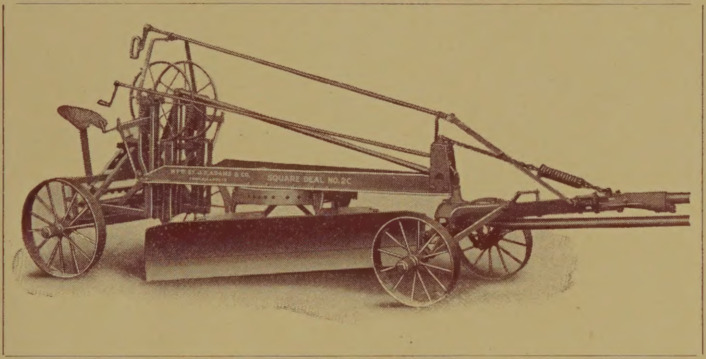
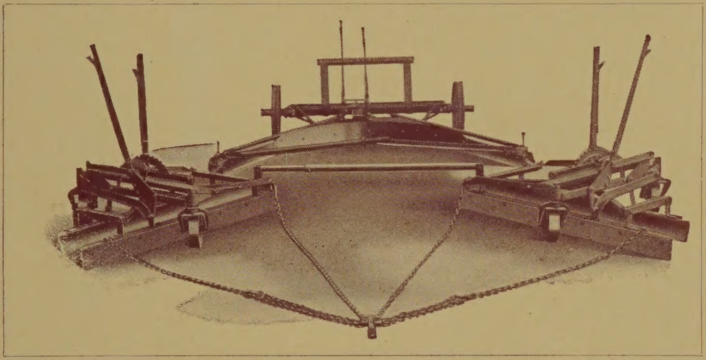
MOST MILES OF GOOD ROADS PER DOLLAR



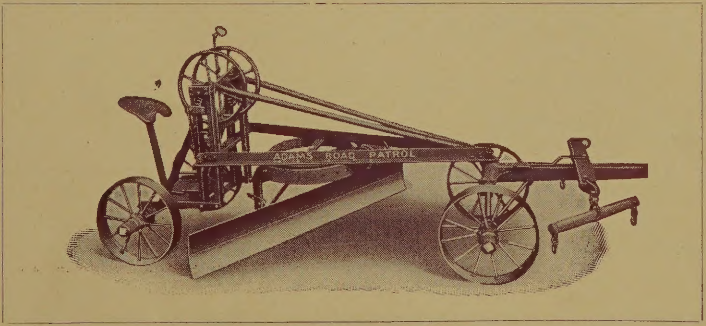
Road King Grader, 8-Foot Blade



Square Deal No. 2-C, 7-Foot Blade



Adams Road Maintainer



Adams Road Patrol Scraper

translated into working terms means Adams Road Building and Maintenance Equipment

For your road building grading use

ADAMS ADJUSTABLE LEANING WHEEL GRADERS

that are guaranteed to do more work for you with less power and therefore less cost, than any other graders on the market. The difference is in the leaning wheels—an exclusive feature on Adams Graders.

They are built with blades ranging from 7 ft. to 12 ft. long. There's a size to suit your work that can be furnished either for animal or tractor power.

To keep your roads always smooth and properly crowned, use

ADAMS ROAD MAINTAINER

a flexible machine which shapes both sides and crowns the center of the road in one operation, preserving the original contour of the road. Operated by one man and a truck or light tractor, it covers many miles of road a day, making the maintenance cost per mile very low. Adjustable to all road widths and conditions.

ADAMS ROAD PATROL

a mighty popular little one-man, two-horse maintenance machine for maintaining roads by the patrol system. Thousands in use all over the country.

We also manufacture a superior line of Road Drags, Scarifiers, Scrapers, Plows, etc.

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HOME OFFICE AND FACTORY
INDIANAPOLIS, INDIANA

GET IN TOUCH WITH OUR LOCAL DISTRIBUTOR — HE IS THERE TO SERVE YOU

THE road surface above and the culvert below have widely different requirements. Rigid materials that make a satisfactory road surface will sometimes shatter under the stresses to which a culvert is often subject.

←rigid above

The rigid road surface is favored by many engineers because it offers smooth travel to traffic, and resists the abrasive action of heavily loaded wheels.

←elastic below

An elastic culvert construction is desirable in all cases, to withstand the great pressures that may be developed by shifting or hardening soils, or by the impact of traffic.

ARMCO CULVERTS

—because of the arch-like corrugated structure of the sheet metal, have the high elasticity necessary for reliable culvert service. With this they combine the indispensable quality of *purity* of metal, that makes them unique among all constructions in rust-resistance.

Fifteen years' service has proved that "Armco Culverts Endure."

The Dixie Culvert & Metal Company
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